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AUTHOR Steelman, Jane D.
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ABSTRACT

An intervention study was designed to implement and evaluate an instructional program combining the writing process and computers to improve the writing quantity and quality and investigate the apprehensions of middle level students. Subjects, 75 sixth-grade students, were chosen from a relatively small rural school system. The intervention took place over approximately 28 weeks within 2 of the intact 6th-grade classrooms. The 2 experimental groups were involved in a newspaper writing program 2 days per week, 2 hours each day. A control group receiving traditional classroom writing experiences was also employed. Pretest analyses of variance determined that there were no significant differences between the groups on any of the measures used prior to the intervention. Posttest analyses of variance supported the hypotheses that the use of the writing process approach is superior to traditional methods of teaching writing and that the use of the computer enhances the process. (One figure and 3 tables of data are included and 19 references are attached.) (MG)

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Jane D. Steelman

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Writing Achievement of Middle Level Students Using Computers to Write a Newspaper

Jane D. Steelman

Introduction

A problem which has become evident in this decade is the inability of students of all ages to interpret and synthesize information. Students do well on test items emphasizing literal comprehension but have difficulty with higher order thinking skills. The National Assessment of Education Progress (NAEP) results for writing indicate that analytic writing tasks were difficult for students at all grade levels (4,8, and 11) (Applebee, et al., 1986). The ability of students to think and write is related to their level of cognitive development. Myers (1985) states that language is interlocked with learning, thinking and knowing. The more writing students do, the more thinking they do. "Student writing will improve when student learning does; and student learning will improve when students do more writing" (Myers, 1985,p. 24).

A pretest-posttest quasi-experimental design chosen for the present study employed two experimental groups and one control group and controlled for teacher, time on task, student gender and race. The intervention study was designed to implement and evaluate an instructional program combining the writing process and computers to improve the writing quantity, quality, and apprehension of middle level students. The novel approach to the teaching of the writing process was in its presentation through a role-taking experience to promote student development. The technology of computers was utilized in order to facilitate the revision strategies (reflection) so important to the writing process and cognitive development.

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Hypotheses

The were several hypotheses presented in the study. It was believed by the researcher that students in the experimental groups would outperform students in the control group on writing

ability. The researcher believed that students in both experimental groups would write significantly more than students in the control group. The researcher also hypothesized that students in both experimental groups would be less apprehensive about writing than students in the control group. It was further hypothesized that students in the group using computers would outperform students in the group not using computers with respect to all measures.

Theoretical Framework

Writing is not a one-shot deal, but rather a "complex of recursive embedded activities" (Schwartz, H., 1984, p. 239). The introduction of the word processor as a writing tool makes it feasible to teach writing as a process involving many revisions and drafts (MacArthur & Shneiderman, 1986). In a study done by MacArthur and Shneiderman (1986) it was found that students writing with a word processor over the period of one year made significant gains in writing ability.

The flow of a writer's ideas can be facilitated by using a word processing program appropriate to the age and developmental level of the writer. "Creating words on a video screen is like whispering: it seems less threatening than the usual mode of articulation" (Schwartz, H., 1984, p. 245). These "whisperings" on the computer screen encourage risk-taking by the writers which allow them to discover what they know and what they want to know.

In reviewing the literature the researcher discovered few recent studies dealing with computers used to facilitate cognitive development and achievement in writing. An exploratory pilot study done by Carnew and Clark (1985) hypothesized that by using cognitive developmental strategies based on the theories of Feuerstein, one might improve learning abilities in Native American adolescents. It was emphasized by Carnew and Clark that one's formal schooling can have a great effect upon cognitive development (1985). The perceived irrelevance of the curriculum and poorly defined educational objectives are among some of the inadequacies in the

schools contributing to the lack of achievement of Native American children (1985). The experiences in formal schooling should transfer and/or relate to real life experiences of the students in order to constitute effective education (Dewey, 1938).

Wester (1985) implemented an instructional writing program to promote cognitive development of freshmen college students. Wester's study is one of few which suggests a connection between cognitive development and the writing process. It is valuable because it reveals that a curriculum based upon cognitive-developmental theory may have a significant positive impact upon writing, attitude and overall cognitive development of the students involved. One goal of this researcher was to develop a role-taking component for a writing curriculum which is not present in the Wester study. By taking the roles of reporters and editors, the students will be involved in a more visible and active role than that of an implied "professional" writer. Another goal was to implement the writing curriculum with a different age group than the Wester study, i.e., middle level students.

Sample

The students involved in the present study were chosen from a relatively small rural school system. The particular sample consisted of 75 sixth grade students from one middle school randomly assigned by race and gender to three classrooms. The racial distribution of the sample was 68.0% Black, 10.7% Indian, and 21.3% White students. The sample were 52% female and 48% male students.

The per capita income and the median household income are far below those reported for the state and the nation. The county ranks 79th out of 100 in per capita income for the state and the state ranks 36th out of 50 in per capita income for the nation. The county ranks 95th out of 100 in median household income for the state and the state ranks 43rd out of 50 in median household income.

Methods

The intervention took place over approximately 28 weeks from September to April within two of the intact sixth-grade classrooms. The experimental groups were involved in a newspaper writing program two days per week, two hours each day for a total of four hours per week. A control group receiving "traditional" classroom writing experiences was also employed. All intervention was done by one classroom teacher involved in teaching language arts for the entire sixth grade in the school. The researcher was seen frequently by the all groups throughout the study.

Experimental Group 1 (E1)

Prior to implementation of the writing intervention, students in the group using computers were involved in lessons on how to use a computer and a two-week program on keyboarding using the computer program, *Type!* produced by Broderbund (Eicholz, 1987). A two-week intensive program on how to use *Bank Street Writer II* (Bank Street College of Education, 1986), a word processing program designed primarily for students in the middle grades, and revision strategies was executed by the researcher and classroom teacher after keyboarding skills were taught. The revision strategies included activities from the *Bank Street Writer Student Activities* (Bank Street College of Education, 1984). The computer program used to develop advertisements for the school newspaper was *The Print Shop* (Balsam & Kahn, 1985).

All lessons concerning newspaper writing were presented by the regular classroom teacher. The students in both experimental groups voted on a name for their newspaper and chose the sections of the newspaper to which they would contribute. The newspaper writing curriculum was based upon the writing process approach in which students were encouraged to plan for their writing (prewriting), share with peers, revise often, and produce a final product to be published.

Students were involved in the writing program for two days per week, two hours per day, during their regularly assigned language arts block. During these sessions the students worked on many different aspects of writing a school newspaper including gathering information, conducting interviews, sharing with peers, typing on the computer, etc. The newspaper was published approximately every three weeks.

Experimental Group 2 (E2)

The instructor for the group writing the newspaper without the computer was the regular classroom teacher. The newspaper writing curriculum as described for experimental group 1 (E1) was implemented for the same amount of time using only paper and pencil techniques. Students in this group were taught revision strategies using cut and paste techniques on paper. This group did use computers for computer aided instruction (CAI) during regularly scheduled computer class time but they did not use a word processor or do any substantial writing using the computer.

Control Group (C1)

The control received writing instruction from the same regular classroom teacher for two days per week, two hours per day. They were involved in a "traditional" writing program in which students were exposed to some process strategies but these were not done systematically. The control group did not use the computer for writing and did not contribute to the development of a school newspaper. Few peer reviews were done and the majority of the writing topics were defined by the teacher rather than the students. There was a reliance on textbooks for content of instructional lessons.

Independent Variable

The independent variable included in the instructional intervention contained the following three levels which were the treatment conditions: 1) the use of computers with a word processing program (researcher as instructor) 2) the implementation of the writing process approach with the role-taking experience of writing a school newspaper (classroom teacher as instructor) and 3) the control group, receiving no instruction in word processing or newspaper production.

Dependent Variables

Holistic Scoring Guide for Writing (Rubric)

The holistic scoring guide used to evaluate two pretest and two posttest writing samples was adapted by the researcher from previous rubrics used by other researchers at N.C.S.U. (Pritchard, 1987; Wester, 1985). Holistic scoring methodologies have been widely researched for over twenty years by Educational Testing Service (ETS) and others (Myers, 1980) and have been found to be highly reliable and valid. Cooper (Cooper & Odell, 1977) claims that the holistic procedure for the evaluation of writing is "the most valid and direct means of rank-ordering students by writing ability"(p.3).

The pretest and posttest writing samples taken on different days were obtained from all students in each group. Three experienced teachers rated each writing sample to determine its rank. The two scores in agreement were considered to be the sample's score. Inter-rater reliabilities were determined using the three individual scores assigned to each writing sample.

Daly's Writing Apprehension Test

Pretest and posttest scores on assessment of writing apprehension using Daly's Writing Apprehension Test were compared to determine whether or not the interventions provided had an effect on student attitude toward writing. Daly's WAT consists of 26 questions answered using a five point Likert-type scale ranging from "strongly agree" to "strongly disagree" (Daly & Miller, 1975c). The questions are given either positive or negative scores based upon their wording. The writing apprehension score (Writing Apprehension=78 + positive scores-negative scores) may range from 26 to 130 with a higher score indicating lower anxiety.

Writing Quantity

The number of words for each writing sample determined an average number of words for pretest and posttest . The pretest and posttest means were compared for each group to determine significant differences in the amount of writing produced by those students in each group.

Results and Conclusions

Pretest analyses of variance determined that there were no significant differences between the groups on any of the measures used prior to the intervention. Posttest analyses of variance supported the hypotheses that the use of the writing process approach is superior to traditional methods of teaching writing and that the use of the computer enhances the process.

Holistic Scoring Guide for Writing (Rubric)

The analysis of variance performed on the posttest results for writing achievement revealed a significant difference between the three groups, $F(2,64)=3.5631$, $p<.0341$. The Least Significant Difference (LSD) group comparison confirmed that the group using computers to write the

newspaper and the group writing the newspaper without using computers performed significantly ($p<.05$) better than the control group. The mean posttest scores are presented in Table 1.

Insert Table 1 about here

Inter-rater reliabilities ranged from r=.88 to r=.94. These are relatively high and are consistent with reliabilities reported by Cooper & Odell (1977) when using trained raters from similar backgrounds.

Daly's Writing Apprehension Test

A one-way analysis of variance performed using the posttest writing apprehension scores from Daly's WAT revealed no significant differences between the three groups $F(2,71)=0.8197$, $p>.4447$. The mean posttest scores are displayed in Table 2.

Insert Table 2 about here

The writing apprehension score means reported for much of the research by Daly and Miller with college freshmen ranged from 71.86 to 79.28 (Daly & Miller, 1975a, Daly & Miller, 1975b, Daly & Miller, 1975c, Daly, 1978). The mean writing apprehension scores of the sixth grade students in the study range from 93.231 to 98.708. Keeping in mind that the higher the score the lower the apprehension, the pretest and posttest results from the present study, indicate that the sixth grade students may be less apprehensive than the average college freshman.

Writing Quantity

The one-way analysis of variance performed on the posttest writing quantity scores did yield a significant difference between the experimental groups and the control group, $F(2,65)=3.2475$, $p<.0453$. The LSD group comparison revealed that the group using the computer to write the newspaper differed significantly ($p<.05$) from the control group. Table 3 displays the mean posttest scores for writing quantity.

Insert Table 3 about here

Educational and Research Implications

Writing is a complex developmental activity and therefore takes time to work through all of the process in order to be effective. The researcher maintains that even teachers familiar with the writing process may inadvertently short-change students by incorporating only parts of the process or by not committing enough time to the writing program. In a decade when accountability for teaching specific skills is paramount, it is difficult to see that the commitment to a long-term writing program can have greater positive results on student writing than "traditional" methods. Too many times educators are drawn to the quick fix solutions which may or may not be beneficial for students.

The mean scores for all groups with respect to writing apprehension were relatively high compared to groups tested in freshmen English classes (Daly, 1978, Daly & Miller, 1975a, Daly & Miller, 1975b, Daly & Miller, 1975c). Since the higher the score the lower the apprehension, the results indicate that middle level students in the sample were less apprehensive than older students.

The higher apprehension levels exhibited by older students may be due to the cognitive stress placed upon older students because of the types of writing required, the broader audience defined, or the added number of years in which to encounter unsuccessful writing experiences.

Students who tend to write more may eventually increase in writing achievement; therefore, it is important to not only show an increase in writing quality but also in writing quantity. Even though the pretest and posttest were administered using paper and pencil, the students who used the computer throughout the year to compose text became more willing to produce larger amounts of text. Significant differences were found between the three groups involved in the study with respect to the amount of writing done in the posttest writing samples. The amount of writing done by the group using computers to write the newspaper (E1) was a significantly ($p<.05$) greater than the control group (C1). These findings imply that the computer may have a freeing affect, allowing students to gain writing fluency.

A major goal of education should be to produce students who can think creatively and express their ideas effectively to others. Student writing must be encouraged throughout the grades, but especially at the middle level since these pre-adolescents have a great need and desire to express themselves. The use of a major project which gives the students experiences beyond the school environment is very important to providing middle level students with "real" situations which they may see as worthwhile. The participation in projects the students see as worthwhile may increase their motivation and involvement.

The experimental group using computers had higher mean scores than the other two groups (see Tables 1 and 3) and differed significantly ($p<.05$) from the control group with respect to writing quality and quantity even though there were limited computer resources, i.e., seven computers. If one can generalize beyond this sample to populations with similar characteristics, this indicates a need to provide students with more computer resources and more time to write

across the curriculum using word processors. Further studies should be done in school environments which have greater computer resources.

Prior studies done on the writing process and computers produced no significant results but were much shorter than the present study. The present study seems to indicate that it may be important for future studies to implement a curriculum plan which includes teaching the word processor and keyboarding skills prior to the implementation of a writing project. This researcher found that the preliminary activities including teaching the word processor and keyboarding took as much time as the total time devoted to many of the previous studies. The researcher believes that the preliminary activities are necessary to the study in order to see if the program implemented really has a positive effect rather than putting the students in a more stressful environment of trying to learn the new technology while trying to produce a product. The program cannot be effectively evaluated when one is really evaluating the students ability to cope with an inordinate amount of challenge. The developmental nature of the writing process reflects a need for any researcher undertaking a project to improve writing ability to devote at least one school year to the effort.

The results of the study should be generalizable to many school systems within similar rural geographic locations. There are certainly many school systems which are located in rural areas supporting little industrial development. There may also be schools or school systems which have a high concentration of minority students.

Since significant results were obtained, the study should be replicated using more than one teacher, school, and/or school district. Different aspects of the research could be studied individually. Contributions of collaboration, use of student peer response guides, audience awareness, and role-taking could be considered as possible explanations for effectiveness of the intervention.

There is no one definitive study which will give all the answers to our questions regardless of the research design utilized (Light, 1984). It is the hope of this researcher that some light may be shed upon an improved way to teach writing utilizing our most recent technology.

Table 1

Eight-point Holistic Scoring Guide

Measure of Writing Achievement

Posttest

Group	n	M	SD
Experimental 1	22	7.886	3.306
Experimental 2	25	7.280	3.536
Control	20	5.200	3.350

$F(2,64)=3.5631$, $p < .0341$

Table 2

Daly's Writing Apprehension Test

Measure of Writing Apprehension

Posttest

Group	n	M	SD
Experimental 1	24	94.667	18.568
Experimental 2	26	93.231	15.713
Control	24	98.708	11.638

$F(2, 71)=0.8197$, $p > .4447$

Table 3

Number of Words per Writing Sample

Measure of Writing Quantity

Posttest

Group	n	M	SD
Experimental 1	22	295.000	128.385
Experimental 2	25	258.880	141.179
Control	21	197.429	104.932

$F(2,65)=3.2475$, $p < .0453$

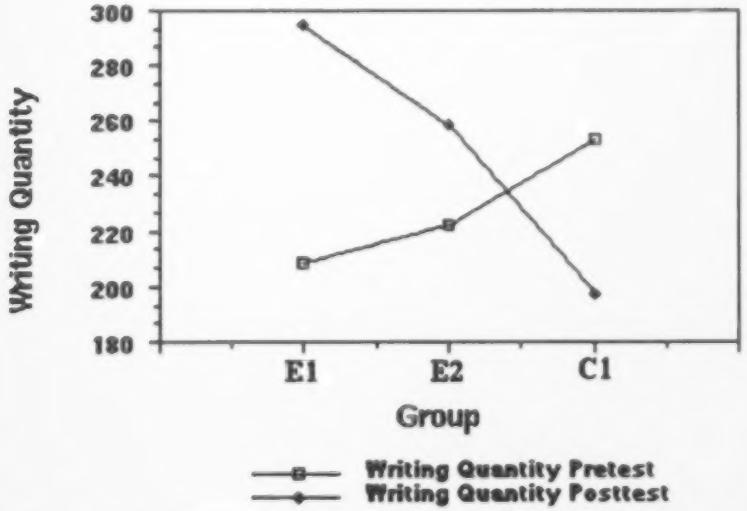

Figure 1. Graph of Writing Quantity for the three groups involved in the study

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